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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,085	08/31/2001	Masayuki Hirano	046124-5092	7669

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EXAMINER	
WANG, GEORGE Y	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/943,085	HIRANO ET AL.	
	Examiner	Art Unit	
	George Y. Wang	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 18, 2003 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1 and 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skillicorn et al. (U.S. Patent No. 5,077,771, from hereinafter "Skillicorn") in view of Yahata et al. (U.S. Patent No. 4,734,924, from hereinafter "Yahata").

3. Regarding claim 1, Skillicorn discloses an X-ray generating apparatus having an X-ray tube (fig. 2, ref. 44) within a housing sealed into vacuum for generating an X-ray by focusing an electron emitted from a cathode (fig. 5, ref. 68) into an anode target (fig. 2, ref. 58) by way of a grid electrode (fig. 2 ref. 70) on the focusing electrode (fig. 2, ref. 72) side of cathode. The apparatus also includes a grid voltage control for controlling a grid voltage applied to grid electrode (col. 4, lines 60-66), and pulse generator (fig. 2, ref. 10) which changes from an OFF state to an ON state and keeps the ON state for a predetermined period of time (col. 4, lines 60-66).

Although Skillicorn teaches a cathode detection resistor (fig. 5, ref. 188), Skillicorn, however, fails to specifically disclose that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the

cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state.

Yahata discloses an x-ray generator with a cathode current detection means (fig. 1, ref. 21; fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cathode current detection means so that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state (col. 2, line 58 – col. 3, line 29). One would be further motivated to include a cathode current detection means because it produces a second switching means for short-circuit detection as a result of current. This detection of an abnormal current at the sides of the x-ray tube, when detected, results in a noncoincidence between voltages across resistors to immediately opens the power source switch and filament switch and prevents x-ray projection (col. 2, line 58 – col. 3, line 29). A cathode current detection means assists the system in reducing malfunction as well as increase productivity control in ON and OFF states (col. 3, lines 8-29).

4. As to claim 3, Skillicorn discloses an X-ray generating apparatus as recited above with a cathode current detecting resistor (fig. 5, ref. 188). The grid voltage control possesses a negative voltage generating section for generating a predetermined negative voltage (col. 10, lines 30-32), a pulse inverter (fig. 6a, ref. 232) for inputting and generating an inverted pulse in which the ON and OFF states of the inputted pulse are inverted, a switch (fig. 6a, ref. 26) for inputting the inverted pulse generated by the pulse inverter and outputting, when the inverted pulse is in the ON state, the predetermined negative voltage generated by the negative voltage generating section, a reference voltage generating section for generating a reference positive voltage (fig. 5, ref. 55), a second switch (fig. 6a, ref. 36) for inputting the pulse generated by the pulse generating means and outputting, when the pulse is in the ON state, the reference positive voltage (col. 10, lines 30-32) generated by the reference voltage generating section, an operational amplifier (fig. 5, ref. 260) having one input terminal for inputting a voltage generated by the cathode current detecting resistor and the other input terminal for inputting the predetermined negative voltage outputted from the switch and the reference positive voltage outputted from the second switch, and a grid voltage control circuit (abstract) for controlling, in response to an output from the operational amplifier, the grid voltage applied to the grid electrode .

5. Regarding claim 4, Skillicorn discloses an X-ray generating apparatus having an X-ray tube (fig. 2, ref. 44) within a housing sealed into vacuum for generating an X-ray by focusing an electron emitted from a cathode (fig. 5, ref. 68) into an anode target (fig.

2, ref. 58) by way of a grid electrode (fig. 2 ref. 70) and a focusing electrode (fig. 2, ref. 72). The apparatus also includes a grid voltage control for controlling a grid voltage applied to grid electrode (col. 4, lines 60-66), and pulse generator (fig. 2, ref. 10) which changes from an OFF state to an ON state and keeps the ON state for a predetermined period of time (col. 4, lines 60-66). Skillicorn also teaches an X-ray imaging apparatus (col. 3, lines 11-13; col. 17, lines 36-40) that receives the pulse generated by the pulse generating means and captures the X-ray transmission image when the pulse is in the ON state. Furthermore, the Skillicorn reference teaches an X-ray inspection system (col. 17, lines 49-59) possessing the aforementioned x-ray generator, such that when the pulse generator has a trigger signal outputting means for outputting a trigger signal (col. 13, lines 42-47) according to the detection of the object and where the imaging means receives the pulse outputted from the pulse generator and captures the X-ray transmission image when the pulse is in the ON state.

Although Skillicorn teaches a cathode detection resistor (fig. 5, ref. 188), Skillicorn, however, fails to specifically disclose that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state.

Yahata discloses an x-ray generator with a cathode current detection means (fig. 1, ref. 21; fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cathode current detection means so that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state (col. 2, line 58 – col. 3, line 29). One would be further motivated to include a cathode current detection means because it produces a second switching means for short-circuit detection as a result of current. This detection of an abnormal current at the sides of the x-ray tube, when detected, results in a noncoincidence between voltages across resistors to immediately opens the power source switch and filament switch and prevents x-ray projection (col. 2, line 58 – col. 3, line 29). A cathode current detection means assists the system in reducing malfunction as well as increase productivity control in ON and OFF states (col. 3, lines 8-29).

6. Regarding claim 5, Skillicorn discloses an X-ray generating apparatus having an X-ray tube (fig. 2, ref. 44) within a housing sealed into vacuum for generating an X-ray by focusing an electron emitted from a cathode (fig. 5, ref. 68) into an anode target (fig.

2, ref. 58) by way of a grid electrode (fig. 2 ref. 70) and a focusing electrode (fig. 2, ref. 72). The apparatus also includes a grid voltage control for controlling a grid voltage applied to grid electrode (col. 4, lines 60-66), and pulse generator (fig. 2, ref. 10) which changes from an OFF state to an ON state and keeps the ON state for a predetermined period of time (col. 4, lines 60-66). Skillicorn also teaches an X-ray imaging apparatus (col. 3, lines 11-13; col. 17, lines 36-40) that receives the pulse generated by the pulse generating means and captures the X-ray transmission image when the pulse is in the ON state. Furthermore, the Skillicorn reference teaches an X-ray inspection system (col. 17, lines 49-59) possessing the aforementioned x-ray generator, such that when the pulse generator has a trigger signal outputting means for outputting a trigger signal (col. 13, lines 42-47) according to the detection of the object and where the imaging means receives the pulse outputted from the pulse generator and captures the X-ray transmission image when the pulse is in the ON state.

Although Skillicorn teaches a cathode detection resistor (fig. 5, ref. 188), Skillicorn, however, fails to specifically disclose that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state.

Yahata discloses an x-ray generator with a cathode current detection means (fig. 1, ref. 21; fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cathode current detection means so that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state (col. 2, line 58 – col. 3, line 29). One would be further motivated to include a cathode current detection means because it produces a second switching means for short-circuit detection as a result of current. This detection of an abnormal current at the sides of the x-ray tube, when detected, results in a noncoincidence between voltages across resistors to immediately opens the power source switch and filament switch and prevents x-ray projection (col. 2, line 58 – col. 3, line 29). A cathode current detection means assists the system in reducing malfunction as well as increase productivity control in ON and OFF states (col. 3, lines 8-29).

Response to Arguments

7. Applicant's arguments filed 18 August 2003 have been fully considered but they are not persuasive.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In the present situation, the feature which Applicant is concerned with is a cathode detecting means attains a value when a pulse is in an ON state. Applicant argues that the Yahata reference fails to teach this limitation. However, Examiner notes that Yahata teaches this limitation in col 3, lines 15-24 as recited in the rejection above.

As for Applicant's argument with regards to "statement (2)," Examiner asserts that the argument is not supported. Applicant asserts that even if it is correct, it would fall short. However, Applicant does not provide and reasoning other than the fact that Examiner rejects it as being obvious. Applicant does not provide any reason as to why the obviousness rejection is inadequate or insufficient.

Therefore, Examiner holds to the validity of the references used and maintains rejection.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 703-305-7242. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 703-305-3492. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

gw
October 30, 2003

T. Chowdhury
Primary Examiner